

45 (New). A device according to claim 42,

cont. AS
wherein the semiconductor device is one selected from a group consisting of video camera, digital camera, projector, goggle type display, car navigation system, personal computer and portable information terminal.

REMARKS

We are in receipt of the Office Action dated August 8, 2001, and the accompanying Amendment and remarks are made in light thereof.

Initially, Applicant affirms the election of Group I, including claims 1-34 and 42, which are drawn to a semiconductor device. Claims 35-41, which are directed to a method of making a semiconductor device, are withdrawn. As a consequence, the title of the invention is amended to delete the reference to the method of manufacturing a semiconductor device and reads merely "Semiconductor Device."

In the Office Action, the Examiner made two objections to the drawing. First, with respect to Fig. 27A, the Examiner has requested that a legend of "prior art" be added. A proposed correction to Fig. 27A, showing the new language in red, accompanies this Amendment.

The drawings were also objected to for including a reference not mentioned in the description, specifically, element 605. Applicant respectfully requests that this objection be withdrawn. Reference numeral 605 is used in Fig. 6 and is discussed in the specification at page 41,

line 7, which refers to “a liquid crystal material 605...”.

In reviewing the drawings, Applicant found additional errors. Specifically, in Figs. 15D-15E and 33A-33B, incorrect reference numerals were used. Proposed revised figures showing the correct reference numerals in red accompany this Amendment. Also, in Figs. 5C, 6, 7, 8A-8C, 9A-9B, 10A-10B, 11A-11B, 23, 24A-24B, 28B and 29A-29B the cross-hatching of certain elements is very faint, and hard to see. To assist the Examiner, additional sheets of drawings containing those figures accompany this Amendment.

Claim 3 has also been objected to because of the misspelling of the word “said.” This misspelling has been corrected in the accompanying Amendment by replacing the misspelled word with “the.”

Now turning to the rejections based upon prior art, the present invention is directed to a semiconductor device comprising a storage capacitor formed on an organic resin film and including an electrode, an oxide film of the electrode and the pixel electrode. In particular, the oxide film is anodic oxide film of the electrode and acts as a dielectric body of the storage capacitor.

In the Office Action, the Examiner rejects claims 1-10, 12, 14, 18, 20, 22-25, 27-29, and 31-33 under 35 U.S.C. 102(e) as being anticipated by Zhang et al., U.S. Patent 6,104,461.

Zhang teaches a black matrix 123 of a titanium film that is formed on a flat polyimide film

112. An inorganic layer 118 of a silicon nitride film is formed on the black matrix 123. A third interlayer insulating film 113 of polyimide is formed on the inorganic layer 118 and the polyimide film 112. Then, a pixel electrode 129 made of ITO is laminated on the third interlayer insulating film (col. 10, line 5 through col. 11, line 57).

As shown in the amendment, the rejected claims have been amended to include the limitation that the oxide film of the first electrode is formed in direct contact with the first electrode or shielding film, and the second electrode or pixel electrode is formed in direct contact with the oxide film. Because the pixel electrode of the present invention is formed in direct contact with the oxide film without the third interlayer insulating film, in contrast to Zhang, Applicant believes the reference does not anticipate the claimed invention.

The Examiner also rejects Claim 42 under 35 U.S.C. 102(e) as being anticipated by Zhong et al., U.S. Patent 5,994,721, citing Fig. 6C. Claim 42 has also been amended to recite the specific feature of the invention, which is not disclosed in the Zhong patent. Thus, the 102 rejection over Zhong should also be overcome.

Claims 11, 13, 15, 19, 21, 26, 30 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al., U.S. Patent 6,031,290, in view of Zhang et al., U.S. Patent 6,104,461, in view of Kunii et al., U.S. Patent 5,412,493. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al., U.S. Patent 6,104,461, further in view of Zhong et al., U.S. Patent 5,994,721. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over

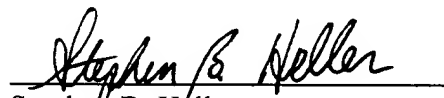
Miyazaki et al., U.S. Patent 6,031,290, in view of Zhang et al., U.S. Patent 6,104,461, in view of Kunii et al., U.S. Patent 5,412,493, in view of Zhong et al., U.S. Patent 5,994,721.

In response, independent claim 11 has been amended to include the specific features of the invention as described above. As none of the references discloses these features, Applicant believes that the 103 rejections should be avoided.

As the independent claims now overcome the 102 and 103 rejections, the claims dependent therefrom, namely claims 13, 15, 16, 17, 19, 21, 26, 30 and 34 should also be allowed.

Accordingly, Applicant submits that the pending claims are now in condition for allowance. Thus, reconsideration and allowance is earnestly solicited.

Respectfully submitted,


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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE TITLE:

Please amend the title of the application as follows: SEMICONDUCTOR DEVICE [AND METHOD OF MANUFACTURING THE SAME].

IN THE CLAIMS:

Please cancel claim 24.

Please amend claims 1-3, 10-11, 27-34 and 42 as follows:

1 (Amended). A semiconductor device [characterized in having a capacitor] comprising:
a first electrode on an organic resin film;
an oxide film of the first electrode [at least on] in direct contact with at least a portion of a surface of the first electrode; and
a second electrode [covering] in direct contact with at least a portion of [said] the oxide film,
wherein a storage capacitor comprises the first electrode and the second electrode with the oxide film interposed therebetween.

2 (Amended). A semiconductor device [characterized in having a capacitor] comprising:
an inorganic film over an organic resin film;
a first electrode on [said] the inorganic film;
an oxide film of the first electrode [at least on] in direct contact with at least a portion of a

surface of the first electrode; and

a second electrode [covering] in direct contact with at least a portion of [said] the oxide film,
wherein a storage capacitor comprises the first electrode and the second electrode
with the oxide film interposed therebetween.

3 (Amended). A semiconductor device according to claim 2, wherein [siad] the inorganic
film is formed by sputtering.

10 (Amended). A semiconductor device comprising;
at least a pixel matrix circuit over a substrate;[,]
[wherein] a storage capacitor [of said] in the pixel matrix circuit; [comprises:]
a shielding film provided over an organic resin film;
an oxide film of [said] the shielding film in direct contact with the shielding film; and
a pixel electrode disposed [on] in direct contact with the oxide film,
wherein the storage capacitor comprises the shielding film and the pixel electrode
with the oxide film interposed therebetween.

11 (Amended). A semiconductor device comprising;
at least a pixel matrix circuit and a driver circuit over a substrate; [characterized in:]
at least an n-channel thin film transistor in the driver circuit;
at least a first lightly doped region in the n-channel thin film transistor;
a first gate electrode in the n-channel thin film transistor;

[that] wherein at least a portion [or all of a lightly doped drain region of a n-channel TFT comprising said driver circuit is disposed so as to overlap] of the first lightly doped region is overlapped with [a] the first gate electrode [of said n-channel TFT];

at least a pixel thin film transistor in the pixel matrix circuit;

at least a second lightly doped region in the pixel thin film transistor;

a second gate electrode in the pixel thin film transistor;

[that a lightly doped region of a pixel TFT that comprises the pixel matrix circuit is disposed so as not to overlap] wherein the second lightly doped region is not overlapped with [a] the second gate electrode [of the pixel TFT];

at least a storage capacitor in the pixel matrix circuit;

a shielding film over an organic resin film;

an oxide film of the shielding film in direct contact with the shielding film;

a pixel electrode in direct contact with the oxide film;

wherein the storage capacitor comprises the shielding film and the pixel electrode with the oxide film interposed therebetween;

[that a storage capacitor in the pixel matrix circuit comprises a shielding film disposed over an organic resin film, an oxide film of said shielding film and a pixel electrode; and]

[that impurity element imparting n type is included in a lightly doped drain region of n-channel TFT that comprises the driver circuit in a higher concentration than that in a lightly doped drain region of the pixel TFT]

wherein the first lightly doped region comprises an n-type impurity at a higher concentration than the second lightly doped region.

27 (Amended). An [electrooptical] electric device [which loads the semiconductor] using the semiconductor device of claim 1 as a display medium.

28 (Amended). An [electrooptical] electric device [which loads the semiconductor] using the semiconductor device of claim 2 as a display medium.

29 (Amended). An [electrooptical] electric device [which loads the semiconductor] using the semiconductor device of claim 10 as a display medium.

30 (Amended). An [electrooptical] electric device [which loads the semiconductor] using the semiconductor device of claim 11 as a display medium.

31 (Amended). [An electrooptical] A device according to claim 27,

wherein [said electrooptical] the electric device is one selected from a group consisting of video camera, digital camera, projector, goggle type display, car navigation system, personal computer and portable information terminal.

32 (Amended). [An electrooptical] A device according to claim 28,

wherein [said electrooptical] the electric device is one selected from a group consisting of video camera, digital camera, projector, goggle type display, car navigation system, personal computer and portable information terminal.

33 (Amended). [An electrooptical] A device according to claim 29,

wherein [said electrooptical] the electric device is one selected from a group consisting of video camera, digital camera, projector, goggle type display, car navigation system, personal computer and portable information terminal.

34 (Amended). [An electrooptical] A device according to claim 30,

wherein [said electrooptical] the electric device is one selected from a group consisting of video camera, digital camera, projector, goggle type display, car navigation system, personal computer and portable information terminal.

42 (Amended). A semiconductor device comprising:

at least a pixel matrix circuit over a substrate;[,]

at least a thin film transistor in the pixel matrix circuit;

at least a pixel electrode electrically connected to the thin film transistor;

[wherein said pixel matrix circuit is planarized by a color filter]

a first color filter over the pixel matrix circuit;

a second color filter over the pixel matrix circuit;

a third color filter over the pixel circuit,

wherein each of the first, second and third color filters is formed between the thin film transistor and the pixel electrode;

wherein each of the first second and third color filters act as a flattening film;

an organic resin film over each of the first, second and third color films;

a storage capacitor in the pixel matrix circuit, said storage capacitor comprising:

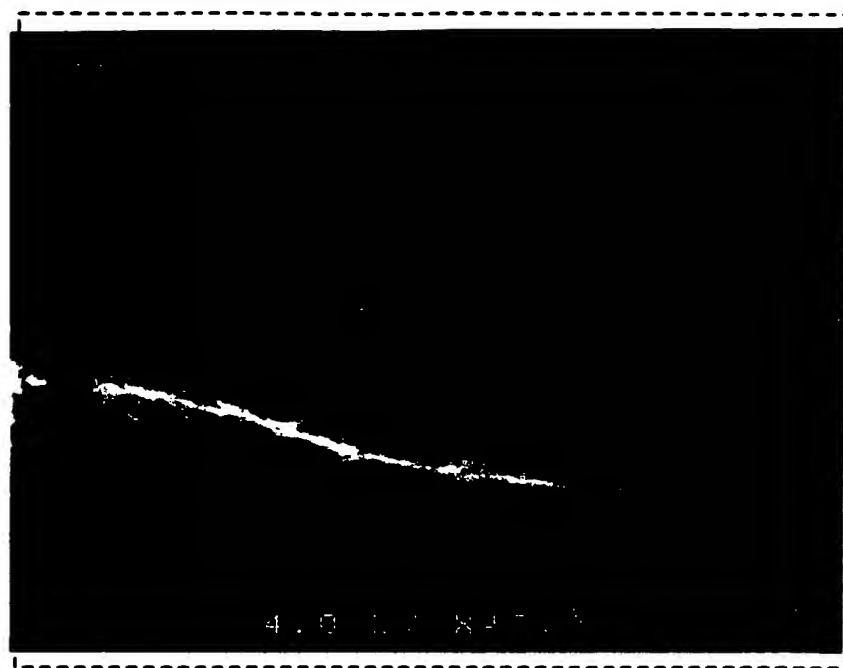
an electrode on the organic resin film;

an oxide film of the electrode in direct contact with the electrode;

the pixel electrode in direct contact with the oxide film.

Fig. 27A

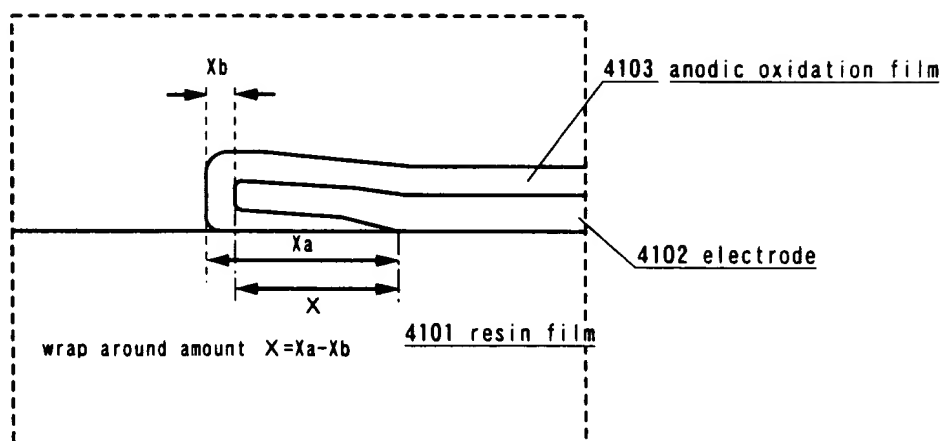
SEM photograph (cross section)



Prior Art

Fig. 27B

schematic diagram of enlarged electrode edge portion



Prior Art

Fig. 15A

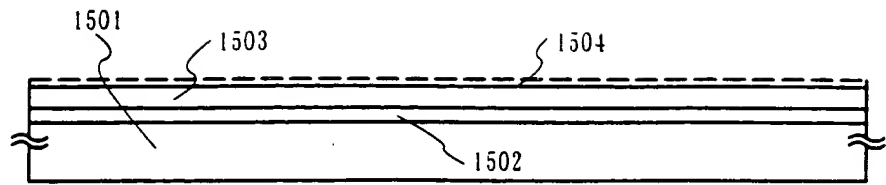


Fig. 15B

crystallization

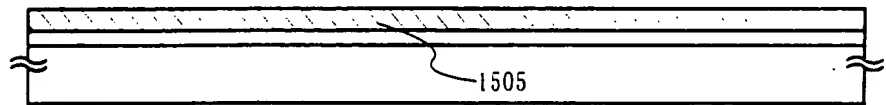


Fig. 15C

phosphorus dope

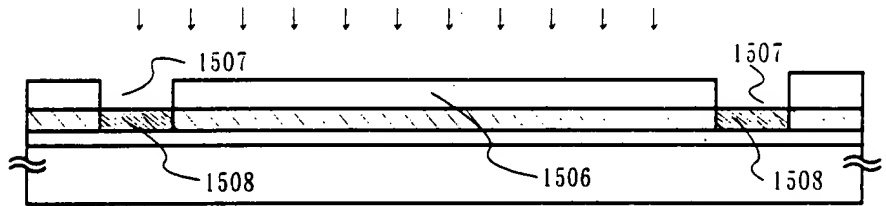


Fig. 15D

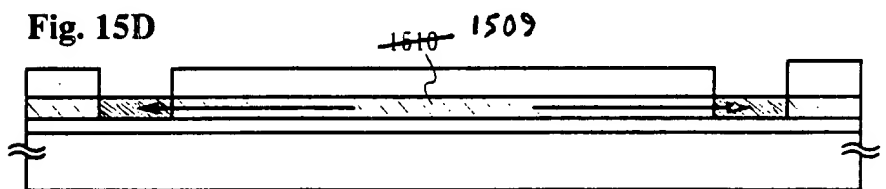


Fig. 15E

formation of active layer

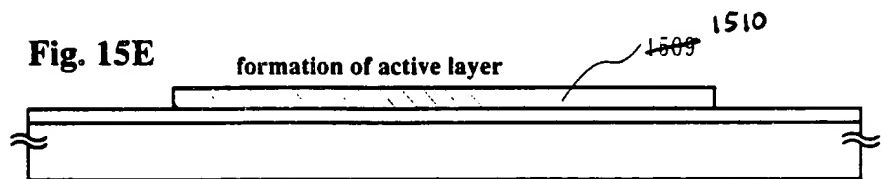


Fig. 33A

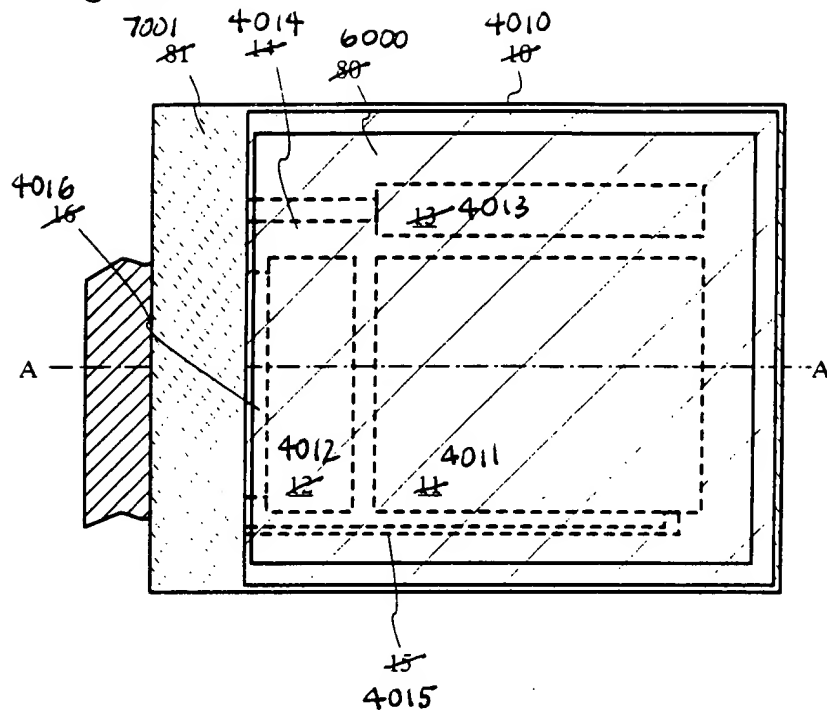


Fig. 33B

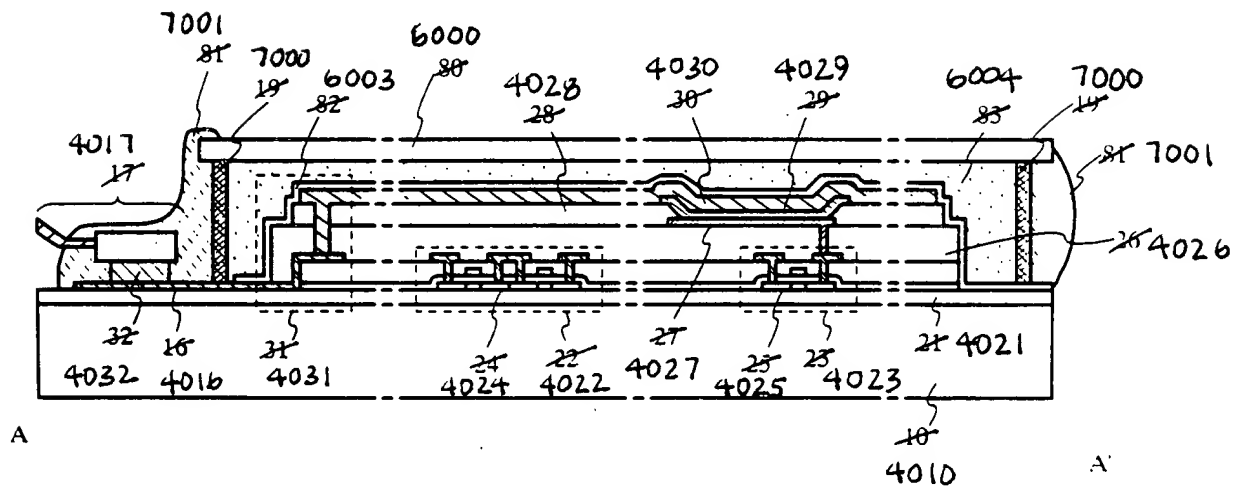
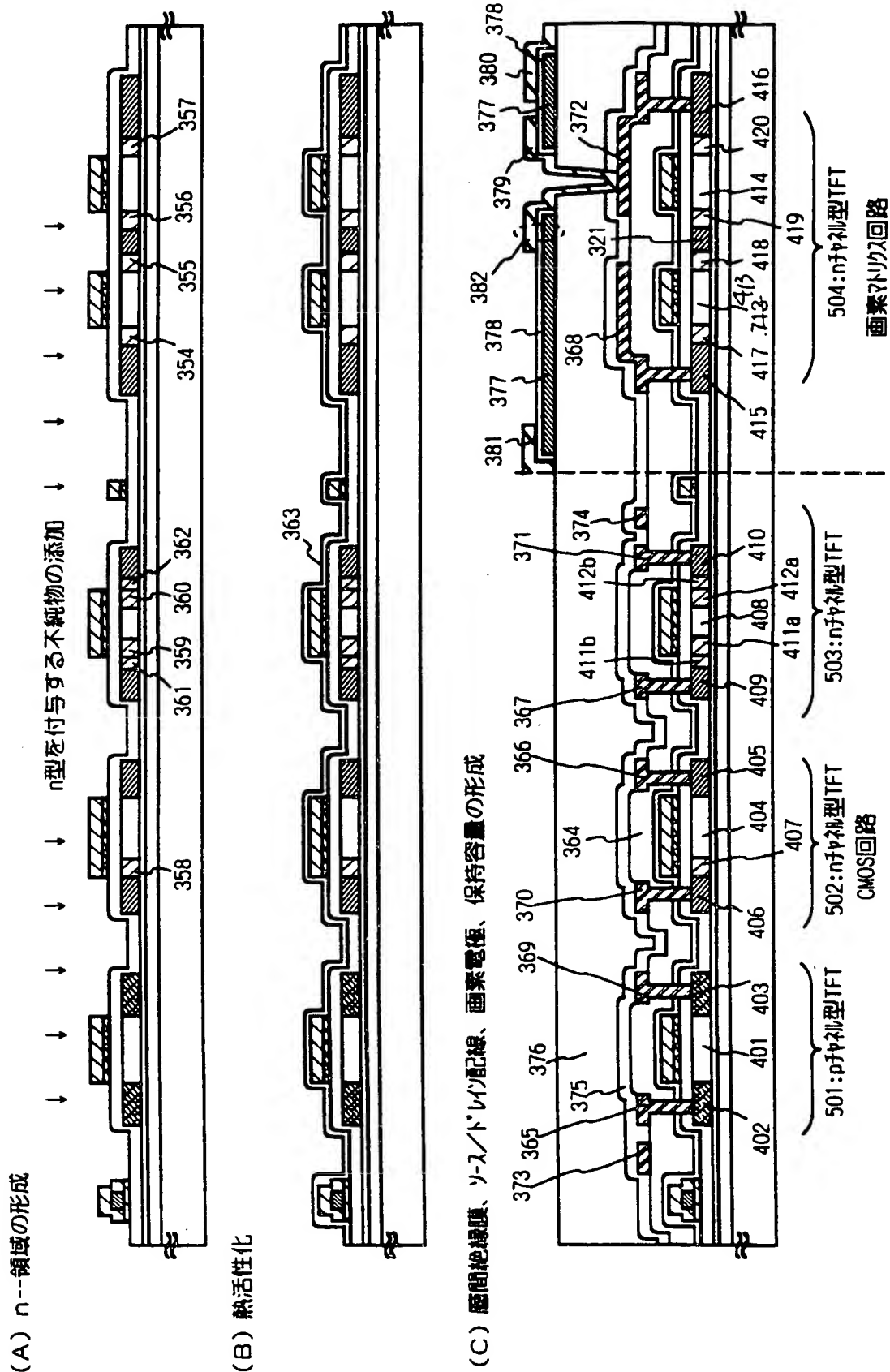
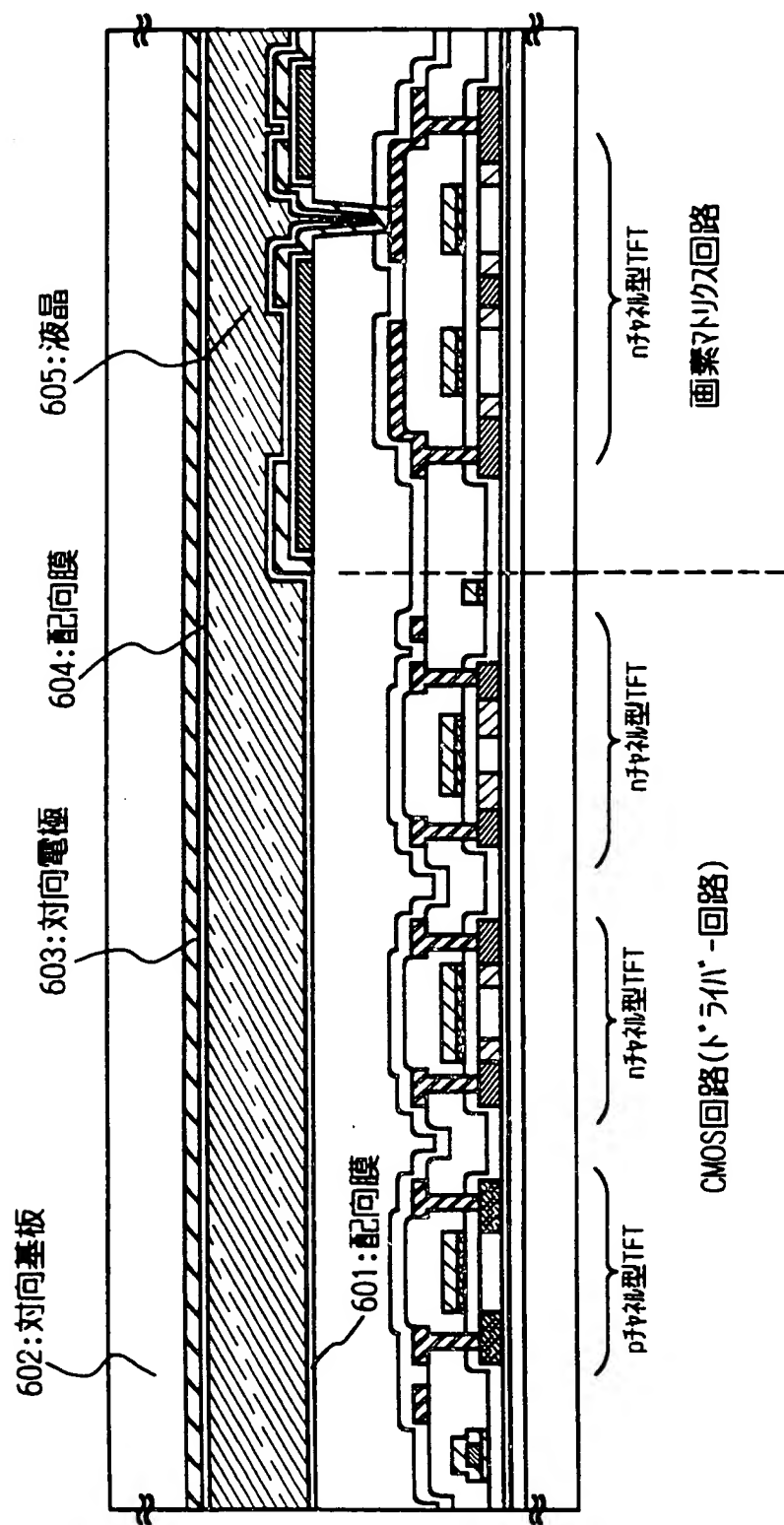


Fig. 5



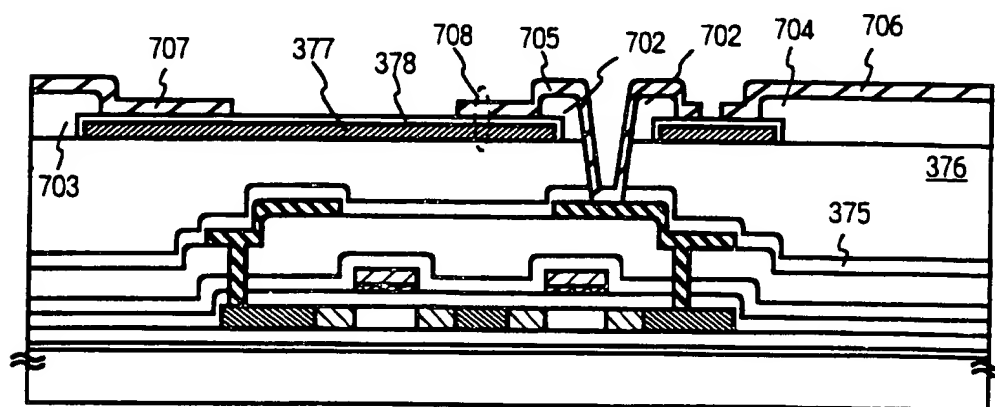
【図6】

Fig. 6



【図 7】

Fig. 7

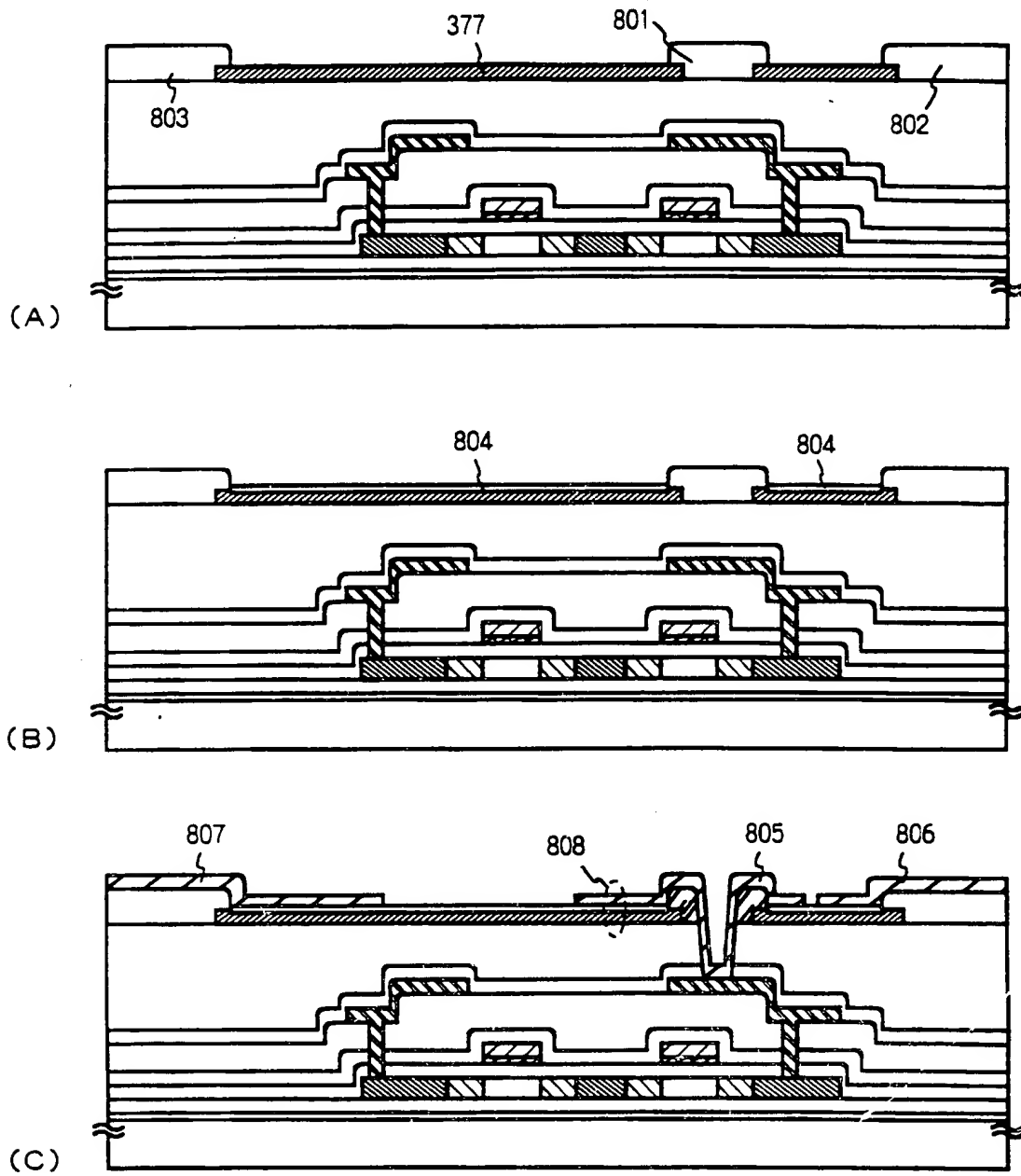


701: n 種補型 TFT

画素マトリクス回路

【図8】

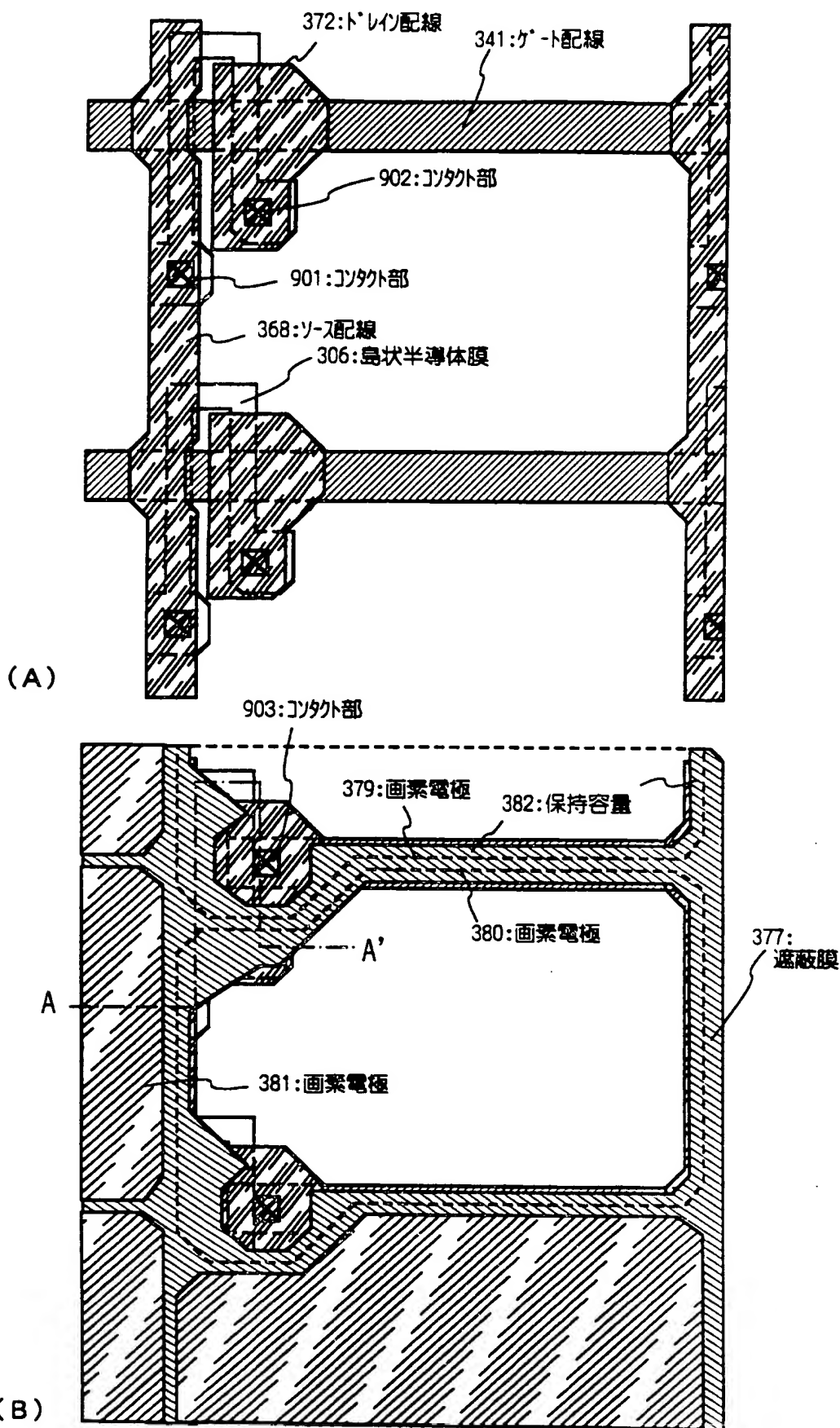
Fig. 8



【図9】

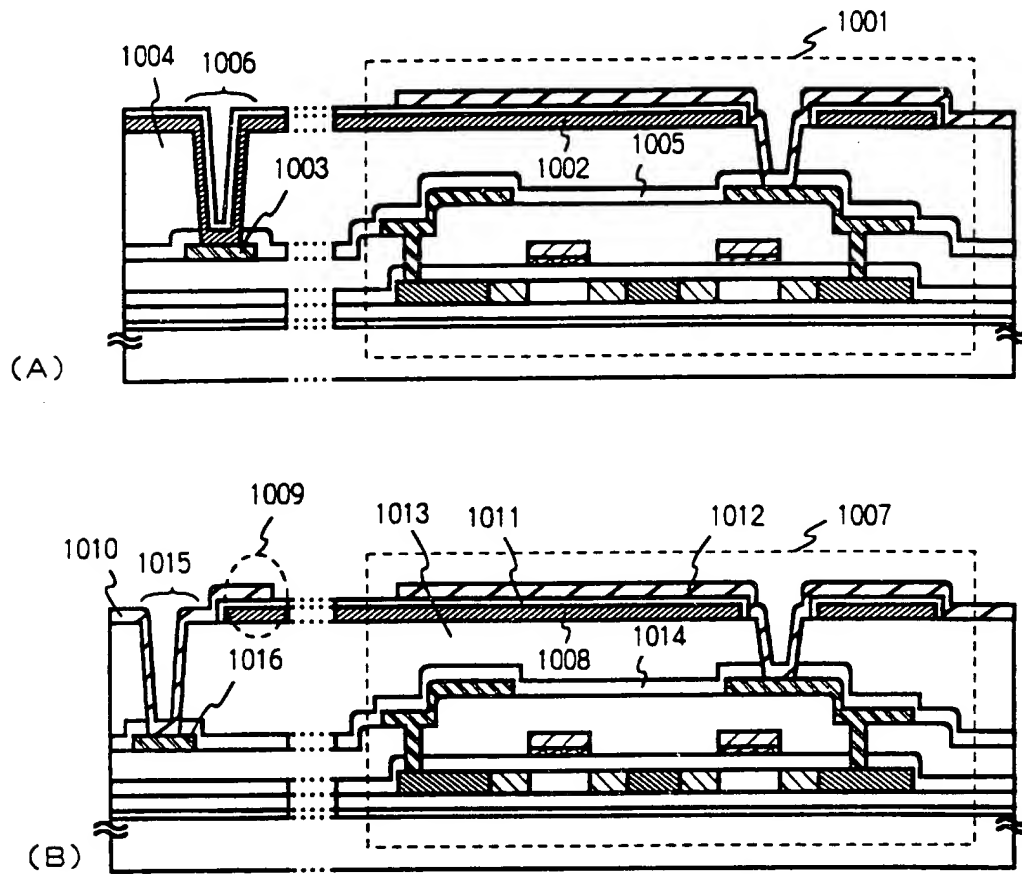
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Fig. 9



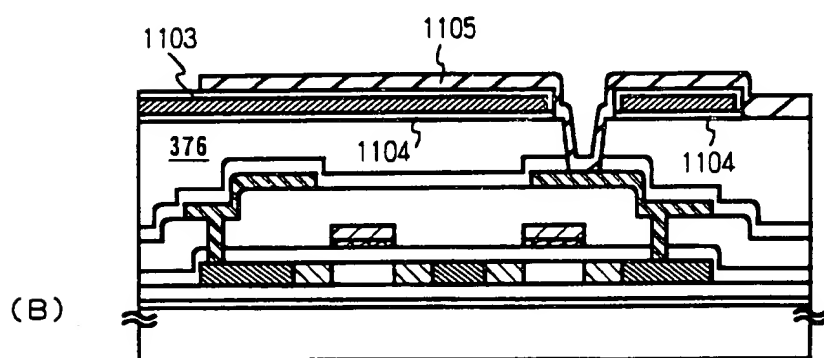
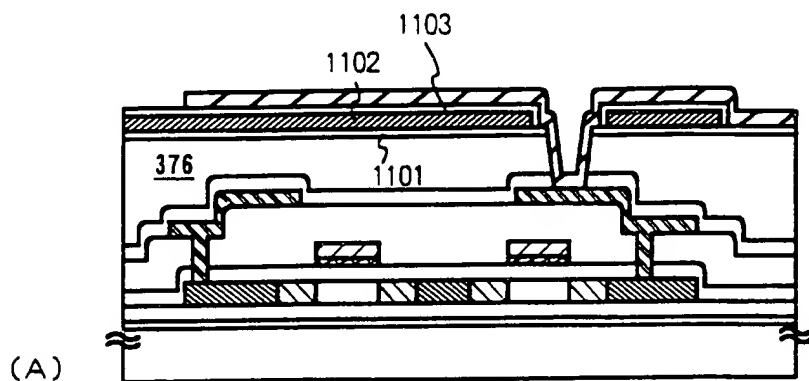
【図10】

Fig.10



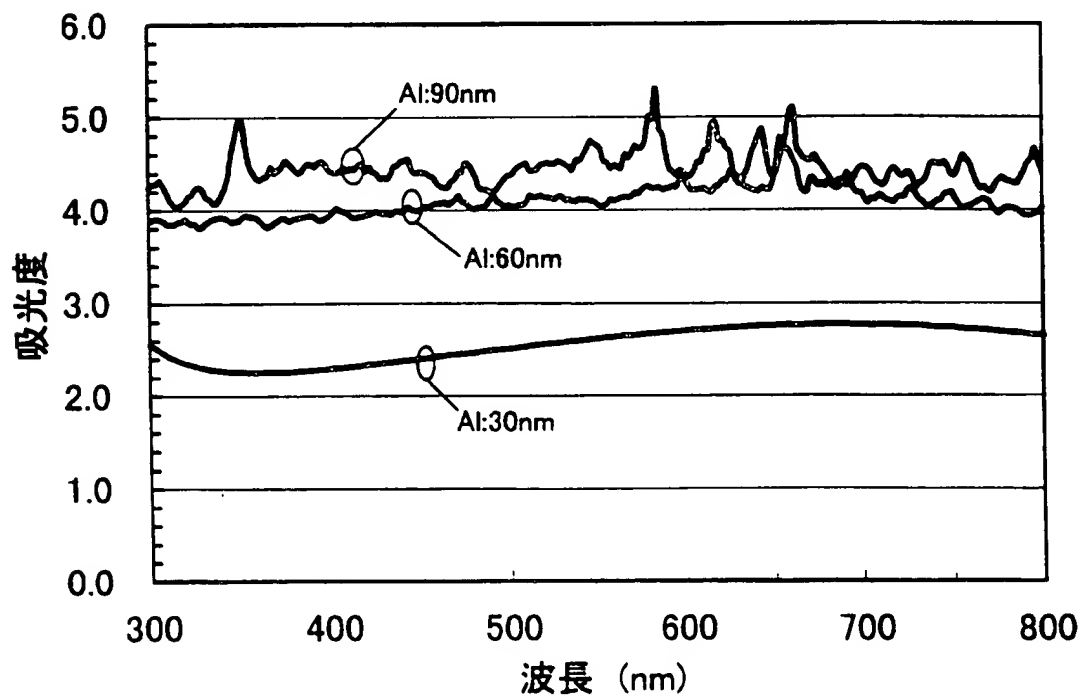
【図 1 1】

Fig. 11



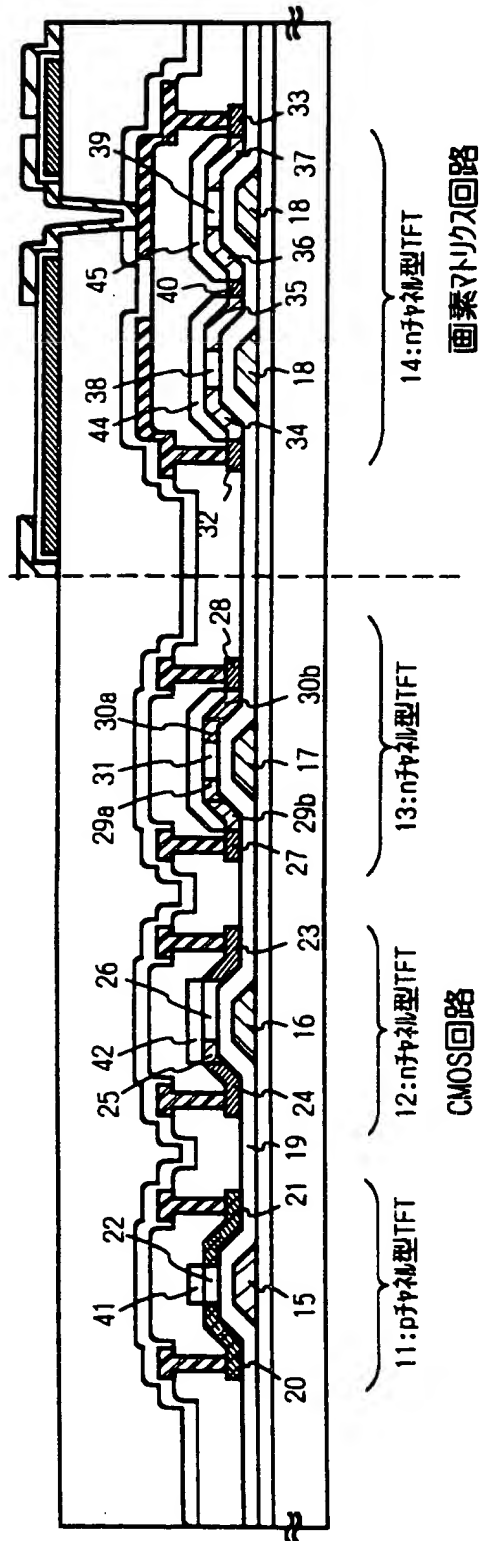
【図 1 2】

Fig. 12



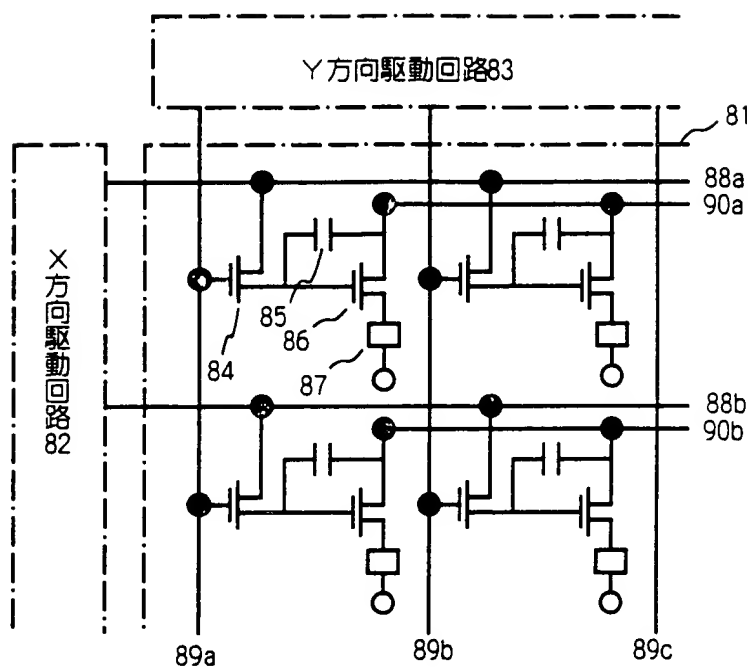
【図23】

Fig. 23



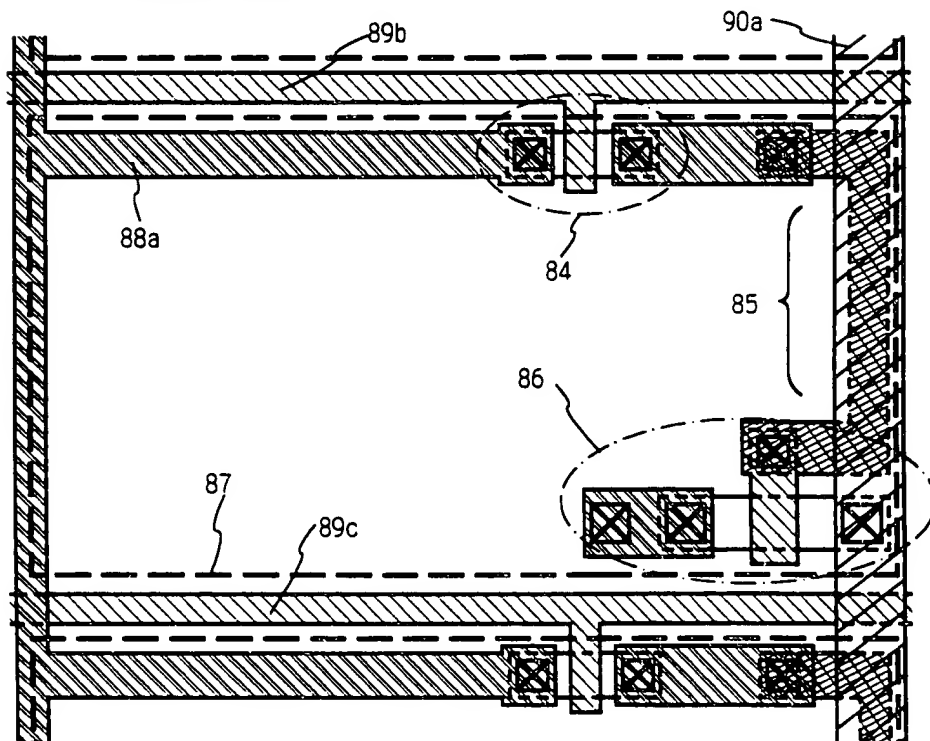
【図24】

(A) ELパネル回路図



81:表示領域 82:X方向駆動回路 83:Y方向駆動回路
 84:スイッチ用TFT 85:保持容量 86:電流制御用TFT 87:有機EL素子
 88a, 88b:X方向信号線 89a~89c:Y方向信号線 90a, 90b:電源線

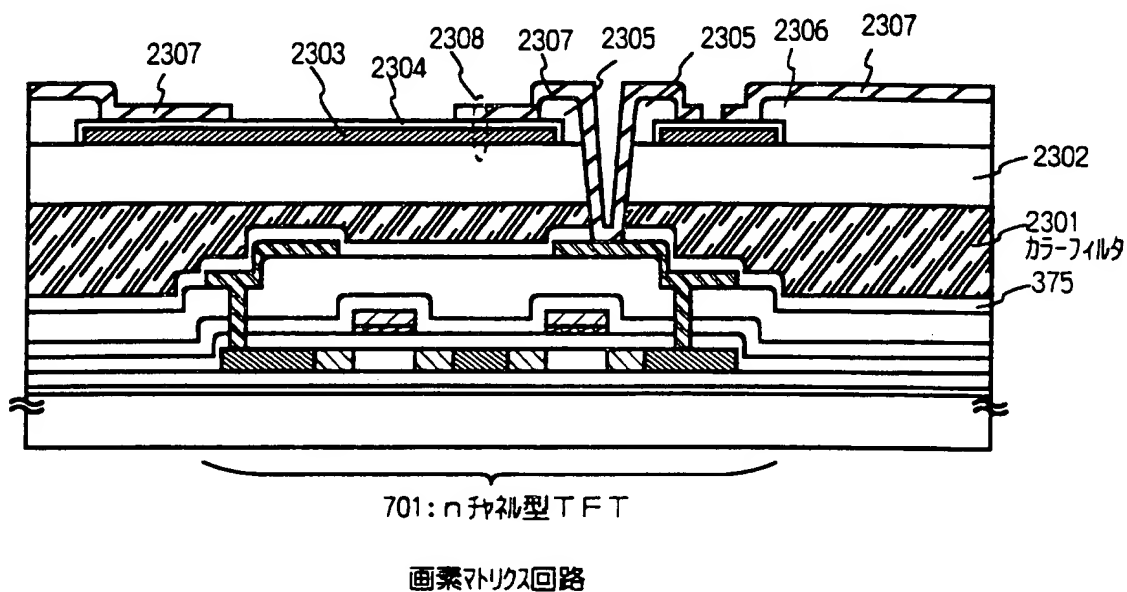
(B) ELパネル画素部上面図



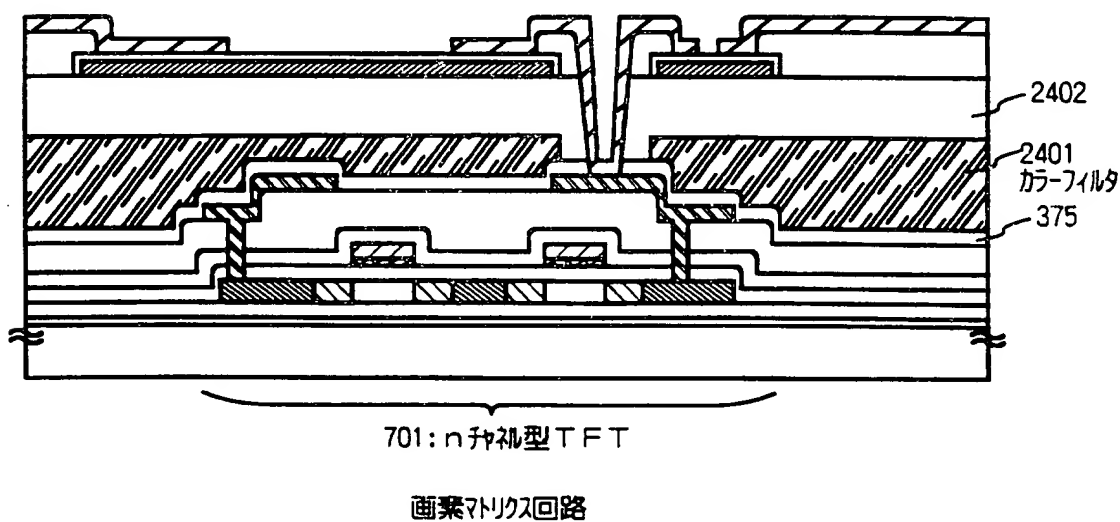
【図28】

Fig. 28

(A)



(B)



【図 29】

Fig. 29

